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## Stories of Modern Science ... from UPI

From the Science & Technology Desk  
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### LITTLE MOUSE, BIG EVOLUTIONARY CHANGES

Researchers studying common wild mice have found evidence of dramatic evolutionary changes within a span of just 150 years. The researchers, from the University of Illinois at Chicago, said the findings suggest genetic evolution can occur a lot faster than anyone thought possible. They compared the genetics of two mice common to the Chicago region -- the white-footed mouse and the prairie deer mouse - and discovered the white-footed mouse had squeezed out the prairie deer mouse from its dominant position. The findings held with DNA samples taken from 56 museum specimens dating as far back as 1855, along with 52 recently captured mice from local forest preserves and state parks. The changes in gene sequence frequencies were dramatic, the researchers said, adding, "It ... suggests that the 'molecular clock' may sometimes, and sporadically, tick blindingly fast."

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### PHYSICISTS CATCH ELECTRONS IN REAL TIME

Physicists have taken the first measurements of individual electrons in real time. In doing so, the researchers, from Rice University, created an experimental method that will allow scientists to probe the interactions between the smallest atomic particles. In an ultracold chamber chilled to temperatures near absolute zero, the researchers were able to observe individual electrons as they moved onto and off a incredibly small piece of semiconductor known as a quantum dot. "Since no one has measured single electron dynamics before, the door is wide open for new investigations," researchers said. "These include studies of the interactions between individual electrons, as well as the quantum phenomena that engineers must understand if they ever want to build a working quantum computer." Quantum computers are much smaller and orders of magnitude more powerful than any computer ever built.

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### CHANDRA SEES BLACK HOLES AT WORK

Images made by NASA's orbiting Chandra X-ray Observatory have revealed two distant cosmic construction sites buzzing with activity. The images show how super-massive black holes control the growth of galaxies. Chandra detected X-rays from vast clouds of high-energy particles around galaxies 3C294 and 4C41.17, which are, respectively, 10- and 12-billion light-years from Earth. The energetic particles were left over from past explosive events that can be traced through the X-ray and radio jets back to the super massive black holes located in the centers of those galaxies. Astronomers said a picture is emerging of a grand cosmic cycle. As a dense region of intergalactic gas cools to form several smaller galaxies, they merge to form a larger galaxy with a super massive black hole at its center. The galaxy and black hole continue to grow until the energy generated by jets from the vicinity of the voracious black hole stops the fall of matter into the black hole. Millions of years after the jet activity subsides, matter will resume falling into the black hole and the cycle begins anew.

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### CHANGING LIGHT AT WILL

MIT researchers claim to have figured out how to gain ultimate control over light. Using the new technique, they said they have been able to shift the frequency of light beams to any desired color with near 100 percent efficiency. As New Scientist magazine reported, the researchers were investigating what happens when shock waves pass through a device called a photonic crystal when they discovered incoming light can become trapped at the shock wave boundary, bouncing back and forth in a "hall of mirrors" effect. As the shock moves through the crystal, the light's wavelength is shifted slightly each time it bounces. If the shock wave travels in the opposite direction of the light, the light's frequency will get higher. If the wave travels in the same direction, the light's frequency drops. By changing the way the crystal is constructed, researchers could control exactly which frequencies go into the crystal and which come out. "The degree of control over light really is quite shocking," they said, adding if the effect can be harnessed, it could result in such abilities as turning heat into light.

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